

## **Automated Data Migration**

### Field of the Invention

The invention relates to a method for transferring data from  
5 a source communication device, in particular a cellular  
mobile phone, to a destination communication device, in  
particular a cellular mobile phone. The invention also  
relates to a system for transferring data from a source  
communication device to a destination communication device,  
10 comprising a destination communication device, and a source  
communication device. The invention further relates to  
communication devices of such systems as well as a computer  
program for transferring data from a source communication  
device to a destination communication device.

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### Background of the Invention

It is commonly known to migrate data, such as contact data,  
messages like SMS or MMS, calendar entries, bookmarks,  
Internet Access point settings, system settings,  
20 applications, application extensions, libraries, add-ons,  
plug-ins and the like from one mobile phone to another. For  
transferring the data a translator software is required,  
which translates data from a source communication device  
into a format readable by the destination communication  
25 device. The translator software, which performs the actual  
conversion of the data format that is used by the source  
communication device to the data format that is used by the  
destination communication device, is generally operated by a  
device that has to be looped-in between the source  
30 communication device and the destination communication  
device. This device may for instance be a personal computer  
(PC), to which both the source communication device and the

destination communication device are connected either concurrently or one after another.

It is also possible that the source communication device is  
5 a PC, which a user has used for backing up data that stems  
from a different device, for instance from a hand-held  
device. The backed-up data then is migrated from the PC to  
the destination communication device on the basis of the  
translator software, which is stored on the same PC or on a  
10 second PC.

From "Support Guide for Transferring Data from other phones  
to the NOKIA 9210i Communicator", Handbook for NOKIA  
communicator users, it is known to transfer data from an  
15 older Communicator model 9110 to a newer Communicator model  
9210i.. In this particular case, it is thus possible to  
transfer data directly between similar devices. However, in  
cases where data is to be transferred between different  
devices, for instance devices of different manufacturers, a  
20 conversion software is required, which may for instance  
reside on a personal computer. For transferring the data,  
first of all the data is loaded into the personal computer,  
wherein it is converted into the correct format by the  
conversion software. The converted data then is transferred  
25 to the new device.

From "Support Guide for Copying Contacts, Calendar and  
Message Data between NOKIA communicator 9200 Series Devices"  
handbook for NOKIA Communicator users, it is known to  
30 transfer data from a communicator device to other devices.  
According to this handbook, it is proposed to copy data,  
which is to be transferred, onto a memory card, remove the  
memory card from the source communication device, insert the  
memory card into the destination communication device and

read the data within the destination communication device.

This method is on the one hand not practical and on the other hand only feasible in cases when data is transferred between similar devices, which in addition both have to

5 provide a memory card interface for storing to and reading from memory cards. Transferring data between devices with different operating systems or even from different series is not possible at all.

10 Transferring data between different devices always requires data converter software. The handling of such a data converter, also known as translator or migrator, is complicated and not very reasonable for users who want to transfer data from one device to another. First of all,  
15 translation software has to be installed. Then, the translation software has to be compatible with the devices between which the data is to be exchanged. In case an error occurs, the migration process will abort and incorrect or incomplete data transfer is the result.

20 To provide compatibility between various devices, the translator software needs to know the source communication device data structure as well as the destination communication device data structure. It also needs to  
25 convert the data into different formats. The translator software needs fully implemented program code for the Application Programming Interfaces (API) of the source and the destination communication device.

30 A user is required to install the translator software manually. Furthermore, the user has to select which data is to be migrated, which device is the source communication device and which device is the destination communication device. Furthermore, it may be required that the user

identifies the type of the source and destination communication device, e.g. manufacturer and series of the device. After that the data is loaded onto a computer, translated and transferred into a new data format and then further transferred to the destination communication device. This may be experienced as time consuming and may also be error prone.

#### Summary of the Invention

To overcome at least some of these problems encountered when transferring data from a source communication device to a destination communication device, the invention proposes a method for transferring data from a source communication device to a destination communication device, comprising establishing a data connection between the source communication device and the destination communication device, transferring a data collector means from the destination communication device to the source communication device, collecting data to be transferred from the source communication device to the destination communication device using the data collector means, and transferring the collected data from the source communication device to the destination communication device using the data collector means.

By providing the inventive method, data may automatically be transferred between different devices. The source and destination communication devices may for instance be hand-held devices such as cellular phones or personal digital assistants. The source communication device may for instance also be a PC onto which data from a hand-held device has been backed up. A data collector means, such as a program, may be transferred from the destination communication device

to the source communication device. After a data connection has been established, the data collector means, such as a small software module or an agent, e.g. a java applet or a java application, may be installed on the source  
5 communication device.

The data collector means is programmed to collect data on the source communication device. This data may be calendar entries, contacts, messages, settings and other. The data  
10 collector means allow transferring the collected data from the source communication device to the destination communication device.

The advantage of the inventive method is that the amount of user interaction required for the transfer of the data from  
15 the source communication device to the destination communication device is reduced. A further advantage is that different source communication devices are supported to be used to collect data and to transfer these onto the  
20 destination communication device. The data collector means need to be customized for the respective source communication device, so as to be able to collect and transfer the data from the source communication device. Data transfer becomes faster and easier to use. Users may easily  
25 switch between different devices and may not have to care about the way the data is transferred between the devices.

To allow migration of the collected data into said destination communication device, it is proposed that  
30 migration means within the destination communication device migrate the data into the destination communication device by translating the transferred data into a data format of the destination communication device. By translating or converting the data, or parts of it, within the destination

communication device, the data collector means does not have to care about the data format of the destination communication device. This reduces programming effort for the data collection means. Translating the data within the destination communication device allows adjusting the received data to the data format of the destination communication device.

Translating or converting only parts of the received data may be particularly appropriate if data is transferred from a source communication device to an older destination communication device, wherein the destination may have less memory, or less functionality, and thus may not be capable of making use of the complete received data.

Transferring the data is done using a wired or a wireless connection. This may be an USB, or fire wire connection as well as an infrared or a Bluetooth® connection. In case of an infrared connection, the user activates the infrared port on the source communication device. The migration means will communicate with the source communication device in response to the activation of the infrared port. In case of using a short range radio link, such as Bluetooth®, the user typically first accepts a connection request on the source communication device before the migration means is able to communicate with the source communication device. This kind of user interaction on the source communication device has been implemented for security reasons in both cases.

It is preferred that the collected data is transferred from the source communication device to the destination communication device using a standard data format. Transferring the data via a standard data format, such as XML, allows using different migration means with different

data collector means. This makes the source communication device independent of the migration means functionally residing within the destination communication device. The same migration means may use any data collector means, as  
5 well as the same data collector means may be used to support a source communication device for different types and models of destination communication devices.

It is therefore proposed that the data collector means  
10 translates the collected data into a standard data format, that the data collector means transfers the translated data to the destination communication device using the data connection, and that the transferred data is translated from the standard format into a destination communication device  
15 specific format using a migration means. The data collector means may for instance be a slender piece of software.

As some source communication devices need a particular data collector means, it is proposed that after establishing the  
20 data connection between the source communication device and the destination communication device, the source communication device is identified. Identifying the source communication device allows selecting the appropriate data collector means to be transferred to the source  
25 communication device for collecting the required data.

Identifying the source communication device is possibly performed by requesting a type identification and/or a capability object of the source communication device. The  
30 capability object may for instance contain information of the manufacturer, information of make or model and the software and firmware version of the source communication device. The destination communication device, in particular the migration means, detects the type of the source

communication device to select the suitable data collector means, e.g. the suitable installation file. A module in the source communication device, such as an instance of the Object Exchange (OBEX) capability service, may serve for  
5 detecting the type of the source communication device. The migration means within the destination communications means may request the capability object from the source communication device. The information contained in the capability object may be used to select the appropriate data  
10 collector means to be installed on the source communication device.

To account for different source communication devices, it is proposed that the migration means provides at least one data  
15 collector means for a particular source communication device, and that after identifying the source communication device, a compatibility between the source communication device and the at least one provided data collector means is checked. This means that the destination communication  
20 device, in particular the migration means, may comprise a repository of different data collector means. These may provide functionality for collecting data from different source communication devices. After identifying the connected source communication device it may be checked,  
25 whether a data collector means within the destination communication device is capable of collecting data within the source communication device. In case a compatible data collector means is found within the repository, it may be transferred to the source communication device to collect  
30 the requested data.

However, it may be possible that none of the at least one provided data collector means is compatible with the current source communication device. In that case it is proposed



that a compatible data collector means is loaded onto the destination communication device. To load the data collector means, it is proposed that a communication connection is established between the destination communication device and a server to download a compatible data collector means for the identified source communication device from the server onto the destination communication device. The communication connection may be established by using any present or future communication protocol. After having established the communication connection with the server, the server may provide the appropriate data collector means for collecting data on the respective source communication device. This may be any piece of software which may be transferred using a data transfer protocol. After having downloaded the data collector means onto the designation communication device, it may be transferred onto the source communication device to collect the respective data.

To allow flexible customising of data collector means and further to allow easy transfer of the data collector means onto the source communication device, it is proposed that the data collector means is an executable file. This may be a binary file which may be transferred to and executed on the source communication device. Other executables, or equivalents, like plug-ins, java applets, etc. can also be used.

In many cases data within a source communication device is stored in particular regions of memory. It may be ciphered, hidden or otherwise protected. The data collector means enables access to the data within the source communication device. The data collector means may for instance possess information on the memory configuration and on specific portions of memory that are used for the storage of data

that is to be transferred to the destination communication device. In this way, the data collector means is able to access the respective information. To access information on different types and models of communication devices, it is  
5 advantageous that the data collector means is customised or at least suited for the respective hardware and software of the different types and models of the source communication device.

10 To simplify the data transfer, it is proposed that the destination communication device controls the data collector means. The migration means within the destination communication device may control the data collector means. In this case, the data collector means is a simple program,  
15 which allows collecting the data on the source communication device. Further steps are controlled by the migration means.

To provide security, many communication means only allow a restricted execution of software. Only signed software  
20 applets, which come from trusted suppliers may access particular pieces of data on the communication devices. To allow collecting the requested data it is proposed that the data collector means are executed on the source communication device according to security rules within the  
25 source communication device.

To enable users to select data which they want to download onto their device from a source communication device, it is proposed that the data collector means collects available  
30 data types within the source destination communication device, that information on the available data types is transferred from the source communication device to the destination communication device, that from the available data types, data types can be selected by a user, and that

only data of the selected data types is collected by the data collector means. The respective data types may be calendar data, contact data, to-do-data, message data, and device setting data, email account data, internet access point settings or any other. It may be necessary not to transfer all available data from the source communication device to the destination communication device. Therefore, it is proposed that a user may select the data types which he wants to be transferred from the source communication device to the destination communication device. After having been selected, the respective data types are collected from the source communication device. The selected data types are collected and the underlying data is transferred to the destination communication device.

To allow easy selection of the available data, it is proposed that the available data types are presented to the user for user selection via a user interface of the destination communication device. This user interface may comprise a display and input means providing the user with the possibility to view and select the desired data types.

A system is further proposed for transferring data from a source communication device to a destination communication device, comprising a destination communication device, and a source communication device, the destination communication device and the source communication device comprising communication means to establish a data connection, the destination communication device providing a data collector means to be transferred from the destination communication device to the source communication device, and the source communication device comprising an operating environment to run the data collector means for collecting data to be transferred from the source communication device to the

destination communication device, and for transferring the collected data from the source communication device to the destination communication device.

5 A communication device is further proposed for receiving data from a source communication device, comprising communication means to establish a data connection with the source communication device, and data collector means to be transferred from the communication device to the source  
10 communication device for collecting data to be transferred to the communication device.

A communication device is further proposed for transferring data to a destination communication device, comprising  
15 communication means to establish a data connection with the destination communication device, an operating environment to run a data collector means provided by the destination communication device for collecting data to be transferred to the destination communication device and for transferring  
20 the collected data to the destination communication device.

A computer program is further proposed for transferring data from a source communication device to a destination communication device, operable to cause a processor to  
25 establish a data connection between the source communication device and the destination communication device, transfer a data collector means from the destination communication device to the source communication device, collect data to be transferred from the source communication device to the  
30 destination communication device using the data collector means, and transfer the collected data from the source communication device to the destination communication device using the data collector means.

The invention will be hereinafter described in more detail with reference to the following Figures.

Brief Description of the Figures

5 The figures show:

Fig. 1 a prior art data converter system;

Fig. 2 a system according to the invention; and

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Fig. 3 an inventive method.

Detailed Description of the Invention

Figure 1 depicts a prior art data computer system including  
15 a destination device 2 and a source device 4, transferring  
data using a data converter 6. Destination device 2  
comprises a user database 12 and a migration tool 14. Source  
device 4 comprises a user database 8 and a migration tool  
10. To migrate data, such as contact data, messages, agenda  
20 data, bookmarks, to-do-lists, Internet Access point  
settings, system settings from source device 4 to  
destination device 2, a data converter 6 in between the  
devices 2, 4 is required. The data converter 6 usually  
comprises translation software, which resides on a computer.  
25 To transfer data, the respective data is read from user  
database 8 and is translated into a common format by the  
migration tool 10. The data converter 6 reads out the data  
from the migration tool 10. The data converter 6 converts  
the received data into a format readable by the migration  
30 tool 14 and provides the migration tool 14 with the  
translated data. After having read the data from the data  
converter 6 the migration tool 14 converts the data into a

format appropriate for the destination device 2 and writes the converted data into the user database 12.

5 The data converter 6 may be a special application on the destination device 4, for instance a program or applet run by the operating system of the destination device 4, or may be running on a PC. In any case, the data converter 6 is able to read the source device 4 data and to convert it into another format. Data converter 6 needs to be an application  
10 being fully implemented for both APIs of the source device 4 and the destination device 2.

The user installs the data converter 6 manually, either on the destination device 4 or on a PC. When utilizing this  
15 data converter 6, the user selects the data to be migrated. The data converter 6 then converts the data from source device 4 into a language readable by destination device 2. After that the data is transferred from the source device 4 to the destination device 2.

20 Figure 2 depicts a system according to the invention. Depicted again are a destination device 2 and a source device 4, each comprising a user database 8, 12. Data is communicated between the destination device 2 and the source  
25 device 4 via an interface 16, which may be an infrared interface or a Bluetooth® interface, or any other wired or wireless interface.

Destination device 2 comprises a migration tool 18. The  
30 migration tool 18 detects the type of the source device 4 via interface 16 automatically and sends via interface 16 a data collector tool 20 onto the source device 4. When the data collector tool 20 is installed on source device 4, under control of the migration tool 18, it is started and

controlled by the migration tool 18. The data collector tool 20 reads data from database 8 and provides the data in a standardised format, such as XML, via interface 16 to the migration tool 18.

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The data collector tool 20 collects data of data types that are supported by the source device 2, and the migration tool 18 migrates the collected data into the destination device 2.

10

To allow communicating with different source devices 4, a set of data collector tools 20 for common source devices 4 are stored in a repository of the migration tool 18. The repository may be shipped together with the migration tool 18, which may permanently reside on destination device 2. To support more source devices 4 and to be able to update newer versions or other applications, the data collector tool 20 may be downloaded from a server (not depicted), if a suitable data collector tool 20 is not available on the destination device 2. In this case, the migration tool 18 may also control the download process (not depicted). The updates and extensions of the data collector tool 20 may also be made available to the destination device 4 on deliverables such as CD-ROM's and memory cards.

25

As the migration tool 18 controls the data collector tool 20, data collector tool 20 does not have to possess sophisticated intelligence or a user interface. The data collector tool 20 may only need to know how to access the information, like memory configuration, or used memory for the individual data types, etc., on the source device 4. Data collector tool 20 also may only need to be able to send the collected data to migration tool 18 upon request. The

migration tool 18 may then process the received information and data.

Figure 3 depicts an inventive system together with the steps  
5 to be carried out to transfer data. Depicted are the same  
elements as in Figure 2. Further depicted are a start module  
18a of the migration tool 18, a core module 18b of the  
migration tool 18 and a reading module 18c of the migration  
tool 18. Also depicted are data repositories 22, which may  
10 be online 22a, or off-line 22b. In addition depicted are  
destination device API 24 and source device API 26.  
Furthermore, steps 30-36 are depicted.

In a first step 30, a connection between the destination  
15 device 2 and the source device 4 is established. When the  
start module 18a of migration tool 18 is started, it  
searches for established infrared or Bluetooth® connections  
with the source device 4. If no connection between the  
source device 4 and the destination device 2 exists, the  
20 start module 18a establishes a new infrared or Bluetooth®  
connection. In case of an infrared connection, the user  
activates the infrared port on the source device 4. The  
migration tool 18 will then communicate with the source  
device 4 when the infrared port has been activated. In case  
25 of a Bluetooth® connection, the user first accepts the  
connection on the source device 4 before the migration tool  
18 is able to communicate with the source device 4. This  
user interaction on the source device is implemented for  
security reasons.

30

After having established a connection in step 30, migration  
tool 18 detects the type of the source device 4. Therefore,  
in step 30, the start module 18a requests the source device  
4 to return a type ID, for instance via an OBEX (Object



Exchange) capability service. OBEX is a session protocol that is optimised for ad-hoc wireless links and can be used to exchange all kind of capability objects like files, pictures, calendar entries and business cards. The start  
5 module 18a requests a capability object from the source device 4, containing information about the manufacture, the module name, and the software and firmware version of source device 4. After having received the capability information of source device 4 within destination device 2, the start  
10 module 18 detects whether a corresponding data collector tool 20 is available within the destination device 4.

The migration tool 18 may include a set of different data collector tools 20 in its repository 22. This may be an off-  
15 line data collector repository 22b as well as an online data collector server 22a. To support as many source devices 4 as possible, without including all kinds of data collector tools 20 within the migration tool 18, it is proposed to download other data collector tools 20 stored on data  
20 collector server 22a. The download may be done using common communication protocols.

In case the migration tool 18 detects a type of source device 4 that is not covered within the off-line repository  
25 22b, it may open an online connection to the data collector server 22a and download the correct data collector tool 20 or request the user to insert a disk or memory card containing a suitable data collection tool (not shown in Fig. 3).

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The data collector tool 20 may be an executable binary file. This binary file is sent in step 32 via interface 16 to source device 4. After being transferred to the source device 4, the migration tool 20 is executed in the source

device 4. It may also be possible that the data collector tool 20 is installed on the source device 4 before being started. The process of the automatic installation of the data collector tool 20 depends on the capabilities and security requirements of the source device 4.

After the data collector tool 20 has been transferred to source device 4 and started therein, it is controlled by a core module 18b of the migration tool 18 in step 34. As the data collector tool 20 is controlled by the core module 18b, it may be a slender piece of software. It may only need to know how to access and extract the data from the source device 4 and how to transfer the data to the destination device 2. The core module 18b requests the data collector tool 20 in step 34 to determine available data types within the source device 4. The data collector tool 20 provides the data types in step 36 using XML via interface 16 to the destination device 2.

On the destination device 2, the migration tool 18 displays available data types on a user interface to a user. A user may select the data types that should be loaded from the source device 4 to the destination device 2. After the user has selected the desired data type or data types via the destination device's user interface, the migration tool 18 requests the data collector tool 20 to collect the respective data for these data types from the user database 8.

Data collector tool 20 uses the source device API 26 to access the user database 8 and to collect the requested data. After the requested data is collected, it is transferred from source device 4 to destination device 2, in particular from the data collector module 20 to a reading

module 18c, using a standard format, such as XML. As a standard format is used, reading module 18c may use data from different data collector tools 20. This enables using source devices 4 independently from the migration tool 18.

5 The same migration tool 18 may use any data collector tool 20 in any source device 4. On the other hand, one data collector tool 20 may be used by any migration tools 18 on any destination devices 2.

10 After the data has been sent to reading module 18c, it is translated into a format used by the destination device 2. This may be done by using an API 24 of destination device 2. The standard data format as provided by data collector tool 20 is thus formatted into an appropriate format that can be  
15 used on destination device 2. After being translated into the appropriate data format, the data may be stored in user database 12.

The inventive method allows data migration from a source  
20 device 2 to a destination device 4 without user interaction. The inventive method may be applicable without a need to manually install software. The migration tool and the data collector tool can communicate with each other without user interaction.

25 A direct connection between the devices which are to exchange data is established, using wireless or wired communication protocols. An additional device in between the respective destination device 2 or source device 4, as is  
30 common within prior art systems, can be omitted. Data may thus be transferred faster and with less errors. The connection between the devices may be established automatically.

Furthermore, a user does not need to care about which type of source device 2 the data is to be loaded from. The correct data collector tool 20 may be chosen according to the identified source device 2 automatically. Data  
5 conversion without error is thus possible, as appropriate tools are selected automatically. It is possible to support different types of source devices, as the implementation effort for implementing data collector tools may be kept low. The main part of the application is independent of the  
10 data structure of the source device. The same data collector module can be used for different destination devices 2 and re-implementation may be restricted to the data structure dependent part.

List of References:

	2	destination device
	4	source device
	6	data converter
5	8	user database
	10	migration tool
	12	data
	14	migration tool
	16	interface
10	18	migration tool
	20	data collector tool
	22	data repository
	24	destination device API
	26	source device API
15	30	request device type
	32	send binary file
	34	control data collector
	36	send data